



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,662	11/09/2006	Ki-Back Han	3103-282	8632
24112	7590	12/11/2007	EXAMINER	
COATS & BENNETT, PLLC 1400 Crescent Green, Suite 300 Cary, NC 27518			ANDERSON, DENISE R	
			ART UNIT	PAPER NUMBER
			1797	
			MAIL DATE	DELIVERY MODE
			12/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/598,662

Applicant(s)

HAN ET AL.

Examiner

Denise R. Anderson

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.138(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

In independent claims 25, 34, and 41 and dependant claim 49, the following limitations of the filtration apparatus are not identified in either the specification or the drawings.

- a. A water cleaning device recited as the invention – Claims 25 and 34 in the preamble. In the patentability analysis, the examiner will assume this is fine filtering apparatus, recited in the title.
- b. Elongated housing – Claim 25 (a), Claim 34 (a) and Claim 49. In the patentability analysis, the examiner will assume this is the main body 1, recited in the specification and the drawings.
- c. Water inlet – Claim 25 (c), Claim 34 (e), Claim 41 (b) and Claim 49. The examiner will assume this is reference part 2 in Figure 2 that feeds the "supplied water guide jacket 7" and a "plurality of supplied water passing holes 8," also shown in Figure 2 and discussed in ¶ 47 of the specification.
- d. Water jacket – Claim 25 (c). In the patentability analysis, the examiner will assume this is the supplied water guide jacket 7, recited in the specifications and the drawings.

- e. Header jacket – Claim 25 (d)-(f). In the patentability analysis, the examiner will assume this is the concentrated filtrate discharge jacket 16, recited in the specifications and the drawings.
- f. Clarified water outlet – Claim 25 (e), Claim 34 (f), Claim 41 preamble, (a), (d)-(e) and Claim 49. In the patentability analysis, the examiner will assume this is the upper discharge pipeline 3, recited in the specifications and the drawings.
- g. Waste outlet – Claim 25 (f), Claim 34 (f), Claim 41 preamble (a), (e), and (h), and Claim 49. In the patentability analysis, the examiner will assume this is reference part 5, shown in Figure 1.
- h. Gas inlet – Claim 25 (g), Claim 34 (g), Claim 41 preamble, and Claim 49. In the patentability analysis, the examiner will assume this is the air supply pipeline 4, with air discharge holes 4b, recited in the specifications and the drawings.
- i. Gas – Throughout the new claims. In the patentability analysis, the examiner will assume the gas is air, as was recited in the specification.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 25-26 and 28-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003). Ytzhak Barzuza et al. discloses a filter element with flexible fibers to filter water "for reasons of potability and palatability." Ytzhak Barzuza et al., Figures 1, Figures 17-23, and Column 1, lines 9-18. The flexible fibers provide a "flushable filter device" that is easily cleaned. Ytzhak Barzuza et al., Abstract, lines 8-9. Ytzhak Barzuza et al. is analogous art. Zha et al.

discloses using gas bubbles to clean flexible fibers in a filtration apparatus used to filter waste water. Zha et al., Column 1, lines 18-25 and 29-30. Zha et al. is analogous art.

6. As was stated above, claim 25 contains limitations with no antecedent basis in the specification. The examiner made assumptions about what these limitations might correspond to in the specification and the drawings. The assumptions are listed above and are incorporated into the patentability analysis that follows.

7. In claims 25 and 26, applicant is claiming a filtration apparatus that has a main body with flexible fibers inside. The flexible fibers are solid, not porous. At one end of the body is an inlet. At the inlet there is a distributor for distributing water into the filtering apparatus. At the other end of the body is a discharge that can discharge clarified water or discharge waste. Air bubbles can also be introduced into the apparatus to help dislodge solids from the fibers. The flexible fibers are attached at one end and free to move at the other. The claims are shown below in italics with the prior art and examiner's comments in normal font.

Claim 25. (New) A water cleaning device (Ytzhak Barzuza et al., Column 1, lines 9-18) for removing fine particles from water, the device comprising:

- a. an elongated housing (Ytzhak Barzuza et al., Figures 20-23, housing 128) forming a main body and having an impervious wall enclosing an interior cavity that extends through the housing;*
- b. a plurality of flexible fibers (Ytzhak Barzuza et al., Figures 1 and 20-23, fibers 6) extending within the cavity for contacting flowing water and*

- removing fine particles from the water without separating a permeate from the water;*
- c. the housing including a pair of opposed end portions wherein disposed adjacent a first end portion is a water inlet (Ytzhak Barzuza et al., Figures 20-23, raw water inlet 130) for receiving a stream of water, the inlet including an annular water jacket (Ytzhak Barzuza et al., Figure 6, where the water is distributed into the cavity through perforations in the bell-like member 35) extending around the first end portion of the housing and being in fluid communication with the cavity for distributing the water within the cavity;*
 - d. a header jacket (Ytzhak Barzuza et al., Figures 20-23, comprised of multiway valve 136, clean fluid outlet 132, and flushing fluid outlet 138) disposed adjacent an opposite second end portion of the housing;*
 - e. the header jacket including a clarified water outlet for discharging a clarified water from the cavity (Ytzhak Barzuza et al., Figures 20-23, clean fluid outlet 132);*
 - f. the header jacket also including a waste outlet (Ytzhak Barzuza et al., Figures 20-23, flushing fluid outlet 138) for discharging a concentrated waste from the cavity;*
 - g. a gas inlet (Zha et al., Figure 1, the inlet labeled "Gas") for directing a gas into the cavity such that the gas may contact the fibers and clean some of the fine particles from the fibers;*

- h. in one mode of operation of the water cleaning device, the water is directed through the cavity and some of the fine particles are removed from the water producing the clarified water that is discharged from the cavity via the clarified water outlet (this is a use of the apparatus and adds no further limitations to the claim); and*
- i. in another mode of operation of the water cleaning device, both the gas and the water are directed through the cavity and some of the fine particles are cleaned from the fibers producing the concentrated waste that is discharged from the cavity through the waste outlet (this is a use of the apparatus and adds no further limitations to the claim.*

Ytzhak Barzuza et al. discloses the claimed device except for the air inlet. Zha et al. teaches the gas inlet in Figure 1 that provides gas bubbles to "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers). Zha et al., Abstract, lines 8-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided the Ytzhak Barzuza et al. filtration apparatus with the gas inlet, as taught by Zha et al., in Figure 1, since Zha et al. states, in the Abstract, lines 8-10, that such a modification would "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers).

Ytzhak Barzuza et al. discloses the claimed invention except that inlet water distribution is done through perforated frustoconical shape 36, shown in Figure 6, instead of the perforated annular shape recited in the claim. A frustoconical shape is an annular shape with slanted sides. It would have been obvious to one

having ordinary skill in the art at the time the invention was made to have, in the Ytzhak Barzuza et al. filtering apparatus, to have distributed the water through a perforated annular shape, instead of a perforated frustoconical shape, because of the equivalence of the two water distributors for their use in the filtration apparatus art and the selection of either of these known equivalents to distribute the water into the filtration apparatus would be within the level of ordinary skill in the art.

Claim 26. (New) The water cleaning device of claim 25 wherein first ends of the fibers are secured to a media fixing plate disposed near a first end of the housing and wherein second ends of the fibers are disposed near a second end of the housing, the second ends of the fibers being unattached and free to move about in the cavity as water passes through the cavity; and wherein the fibers are non-tubular and non-membranous.

Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 25 limitations. Ytzhak Barzuza et al., further teaches non-tubular and non-membranous fibers secured at one end and free to move at the other, as shown in Figures 1, 6, and 20-23.

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003) as applied to claim 25 above, and further in

view of Boye (WO 02/24306 A1, Mar. 28, 2002) for polyamide and polyester fibers and Ford et al. (US Patent No. 4,793,932, Dec. 27, 1988) for polypropylene fibers.

9. Boye (WO 02/24306 A1) discloses a "device for filtering a fluid wherein a plurality of fibres extend longitudinally in the direction of the fluid flow during filtration of said fluid" and that there is a "compressing means being adapted to create a pressure on part or a portion of said outer surface of the flexible membrane." Boye, Page 1, lines 5-8, Page 3, lines 32-35, Figure 3. Boye further teaches that "a major advantage of . . . the present invention is the possibility of flushing the fibres" and that the "flushing process may be either a forward flushing or backward flushing process." Boye is analogous art.

10. Ford et al. discloses a "concentrator for concentrating the fine solids of a liquid feed suspension that has a shell within which there is a bundle of microporous fibers." Ford et al., Abstract, lines 1-3. The concentrator is shown in Figure 1 and is a diaphragm whose volume is altered. Ford et al. is analogous art. The claim is shown below in italics with the prior art and examiner's comments in normal font.

Claim 27. (New) The water cleaning device of claim 25 wherein one or more of the fibers is formed from a material selected from a group including polyamide, polyester, and polypropylene.

Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 25 limitations but does not explicitly disclose the fiber material. Boye teaches the fibers may be nylon (applicant's polyamide) or polyester. Boye, Page 7, lines 6-9. Ford et al., teaches the fibers may be polypropylene. Column 4, lines 39-42.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have installed polyamide, polyester, or polypropylene fibers as taught by Boye and Ford et al., since Boye states at Page 7, lines 5-9 that "different types of fibers may be used for the filtering device, where the types of fibres may be selected in order to fulfill the requirements of a given filtration process." In the Boye case, the "preferred embodiment" was "polyester fibres or nylon fibres" and, in the Ford et al. case the "preferred embodiment" was polypropylene.

11. Claims 28-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003), as applied to claims 25 and 26. To paraphrase claims 28-33, the filtering apparatus has a density control plate (claim 28). The filtering apparatus distributes air through one or more openings (claim 29) located on the media fixing plate (claim 30) that fixes the fiber ends. The filtering apparatus distributes water through an array of openings that are in a circumferential band around the outer wall of the main body (claim 31). There is a porous filter sitting among the nonporous fibers (claim 32) and that porous filter is from 10% to 50% of the volume of the filtering apparatus. The claims are shown below in italics with the prior art and examiner's comments in normal font.

Claim 28. (New) The water cleaning device of claim 26 including a density control plate having an annular shape and disposed within the housing between the

media fixing plate and the annular water jacket for increasing a density of the fibers between the media fixing plate and the water jacket and for generally inhibiting the water from flowing to the media fixing plate.

The density control plate is shown in Ytzhak Barzuza et al. in several figures; Figure 1, reference part 8; Figure 4, reference part 30; Figure 5, reference part 14; Figures 7 and 8, reference parts 40 and 46; Figures 9 and 10, reference parts 48 and 50; Figure 11, reference part 14; Figure 17, reference parts 84 and 86; Figure 18, reference part 102; Figures 20-23, the annulus above the fibers 6. In all cases, the density control plate is disposed within the main body and increases the density of the fibers in that volume, relative to the remaining volume within the main body. In some cases the density control plate is annular in shape. In some cases, the density control plate is between the inlet and the media fixing plate.

The density control plate is also shown in Zha et al. in Figures 2 and 4A, reference part 11 and Figures 6A, 7 and 8, reference part 7. Here, the density control plate is annular in shape, is disposed within the main body and is part of the media fixing plate that sits above the water inlet. The density control plate also increases the density of the fibers in that volume, relative to the remaining volume within the main body. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the Zha et al. density control plate in the Ytzhak Barzuza filtering apparatus as taught by Zha et al., since Zha et al. states in the Abstract, lines 14-16 that such a modification would

"partition" the flexible fibers "into discrete groups to assist in cleaning while maintaining high packing density."

In summary, Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 28 limitations.

Claim 29. (New) The water cleaning device of claim 25 including one or more openings disposed in a member within the housing for conducting a gas into the cavity and dispersing gas within the cavity and about the fibers.

Claim 30. (New) The water cleaning device of claim 29 wherein the one or more openings form an array of openings disposed in a media fixing plate, the array of openings being disposed adjacent ends of the fibers that are secured in the plate and which act to disperse the gas about the fibers.

Claim 31. (New) The water cleaning device of claim 25 wherein an array of openings is disposed in a circumferential band around the outer wall of the housing, the array of openings in the outer wall being aligned with the annular water jacket to conduct the water into the cavity and to distribute the water within the cavity.

Zha et al. discloses several members within the main body that conduct gas into the filtering apparatus through one or more openings. Zha et al., Figure 1 reference part 7; Figure 2, reference part 18; Figures 3A and 3B, reference parts 11 and 22; Figures 4A and 4B, reference parts 11 and 22; Figures 5A and 5B, reference parts 11 and 24; Figures 6A and 6B, reference parts 7 and 30; Figure

7, reference parts 7 and 30; Figure 8, reference part 7; Figure 9, where gas travels up the center and then through slot type aeration holes 52. In several of these embodiments the openings are in the media fixing plate and adjacent to where fiber ends are secured. Finally, Zha et al. discloses an array of openings in a circumferential band around the outer wall of the main body to conduct water into the cavity and distribute water within the cavity. Zha et al., Figure 4B, openings 22.

Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 25 limitations. Zha et al. further teaches a filtering apparatus that distributes gas through one or more openings (claim 29) located on the media fixing plate (claim 30) that fixes the fiber ends. Zha et al. also teaches a filtering apparatus that distributes water through an array of openings that are in a circumferential band around the outer wall of the main body (claim 31). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have included the various array of openings in the Ytzhak Barzuza et al. filtering apparatus as taught by Zha et al., since Zha et al. states at Column 4 lines 14-16 and in the Abstract, lines 8-10, that such modifications would position the openings between the fiber bundles so that "liquid and bubbles entrained therein move past the surfaces of the membranes (applicant's fibers) to dislodge the fouling materials therefrom."

In summary, Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all limitations of claims 29-31.

Claim 32. (New) The water cleaning device of claim 25 including a porous chamber in fluid communication with the clarified water outlet, the chamber disposed in the second end portion of the housing and projecting in among the fibers to receive the clarified water from the cavity.

Claim 33. (New) The water cleaning device of claim 32 wherein a volume of the porous chamber is about 10% to about 50% of a volume of the cavity.

Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 25 limitations. Ytzhak Barzuza et al. further teaches a porous chamber within the flexible fibers that is about 50% of the volume of the cavity. Ytzhak Barzuza et al., Figure 18 and Column 6, line 58 to Column 7, line 20. In summary, Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all limitations of claims 32 and 33.

12. Independent claim 34 and dependent claims 35-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003). Independent claim 34 is analogous to independent claim 25 minus the inlet water distributor. To paraphrase claim 34, applicant is claiming a filtration apparatus that has a main body with flexible fibers inside. The flexible fibers are solid, not porous. At one end of the body is an inlet for supply water and an inlet for air. At the other end

of the body is a discharge that can discharge clarified water or discharge waste. Air bubbles are introduced into the apparatus to help dislodge solids from the fibers.

13. Claim 34 is analogous to claim 25 minus the inlet water distributor and placing the inlet for air near the inlet for water. Zha et al. teaches the latter limitation in Figure 1 that shows gas bubbles being entrained in a liquid stream to "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers). Zha et al., Abstract, lines 8-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided the Ytzhak Barzuza et al. filtration apparatus with the inlet for air located near the inlet for liquid, as taught by Zha et al., in Figure 1, since Zha et al. states, in the Abstract, lines 8-10, that such a modification would "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers). In summary claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al., in view of Zha et al..

14. Dependent claims 35-40 are analogous to dependent claims 26 and 28-32, respectively. To paraphrase dependant claims 35-40 – the flexible fibers are attached at one end and free to move at the other (claims 26 and 35). The filtering apparatus has a density control plate (claims 28 and 36). The filtering apparatus distributes air through one or more openings (claims 29 and 37) located on the media fixing plate (claims 30 and 38) that fixes the fiber ends. The filtering apparatus distributes water through an array of openings that are in a circumferential band around the outer wall of the main body (claims 31 and 39). There is a porous filter sitting among the nonporous fibers (claims 32 and 40). In summary, the patentability analysis for claims 34-40 is

analogous to the above patentability analysis of claims 25-26 and 28-32, respectively, and will not be repeated here. Claims 34-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al., in view of Zha et al..

15. Claims 41-49 are methods claims that describe filtration and backwashing, using the above filtering apparatus. In the above patentability analysis, the filtration apparatus claims were rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al., in view of Zha et al.. In the patentability analysis below, the method claims are also found to be unpatentable over the same references.

16. To paraphrase independent claim 41, applicant is claiming a method to use the above filtration apparatus to filter and to backwash. Applicant's filtration apparatus has a main body with flexible fibers inside. The flexible fibers are solid, not porous. At one end of the body is an inlet. At the other end of the body is a discharge that can discharge clarified water or discharge waste. Air bubbles can also be introduced at the inlet to help dislodge solids from the fibers. The described apparatus was already found unpatentable in the above analysis.

17. Applicant uses the filtration apparatus in a method to filter supply water and then backwash the filtration apparatus to clean it. The steps of the method are:

- (1) Close the waste discharge line and open the clarified water discharge line.
- (2) Let supply water pass through the inlet, into the main body, and be filtered by the flexible fibers.
- (3) Discharge the clarified water.

(4) Begin backwash. Close the clarified water discharge line and open the waste discharge line.

(5) Inject air into water.

(6) Let the air-water mixture pass through the inlet, into the main body, and to clean the flexible fibers.

(7) Discharge the air-water mixture through the waste discharge line.

18. Ytzhak Barzuza et al. discloses the claimed method except for step 5 where gas is injected into water. Zha et al. teaches step 5. The details follow.

19. Ytzhak Barzuza et al. discloses steps 1-4 and 6-7 in Figures 20 and 21. Figure 20 shows the filter mode and Figure 21 shows the backwash mode. Multi-way valve 136 is used to switch between the two. Specifically, multi-way valve 136 switches (steps 1 and 4) between filtering supply water (step 2) and, thus, discharging clarified water (step 3) and backwashing (step 6) and, thus, discharging waste (step 7). In Figure 1, Zha et al. teaches injecting gas bubbles into water (step 5) and letting the gas-water pass through the inlet, into the main body (step 6) and out through a waste discharge line (step 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Ytzhak Barzuza et al. method, to have included a step where air is injected into water (step 5) and the air-water mixture passes through the inlet into the main body to clean the flexible fibers (step 6) as taught by Zha et al., since Zha et al. states, in the Abstract, lines 8-10, that such a modification would "dislodge fouling materials" from the membranes 6 shown in Figure 1 (applicant's flexible fibers).

20. In summary, Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all claim 41 limitations.

21. Claims 42-47 depend on method claim 41 but add no further limitations to the method. Instead, each claim recites various limitations on the filtration apparatus. The various apparatus limitations recited in claims 42-47 are analogous to those found in claims 26 and 28-32, respectively. To paraphrase dependant claims 42-47 – the flexible fibers are attached at one end and free to move at the other (claims 26 and 42). The filtering apparatus has a density control plate (claims 28 and 43). The filtering apparatus distributes air through one or more openings (claims 29 and 44) located on the media fixing plate (claims 30 and 45) that fixes the fiber ends. The filtering apparatus distributes water through an array of openings that are in a circumferential band around the outer wall of the main body (claims 31 and 46). There is a porous filter sitting among the nonporous fibers (claims 32 and 47).

22. The patentability analysis of claims 42-47, then is analogous to that of claims 26 and 28-32, respectively, and will not be repeated here. In summary, Ytzhak Barzuza et al., in view of Zha et al., discloses or suggests all limitations recited in claims 42-47.

23. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003), as applied to claim 41 above. The claim appears below in italics with the prior art and examiner's comments in normal font.

Claim 48 (New). The method of claim 41 including generating turbulence in the treatment cavity by contacting the water with the fibers.

Zha et al. discloses, in Figure 1 and in the Abstract, lines 8-10, that "liquid and bubbles entrained therein move past the surfaces of the membranes (applicant's flexible fibers) to dislodge fouling materials therefrom." Bubbles entrained in a liquid may cause turbulence in the liquid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated turbulence in the Ytzhak Barzuza et al. filtering apparatus by entraining bubbles in the liquid as taught by Zha et al., since Zha et al. states in the Abstract, lines 8-10, that such a modification would aid in cleaning the flexible fibers by dislodging fouling materials from them. In summary, Ytzhak Barzuza et al., in view of Zha et al., disclose or suggest all claim 48 limitations.

24. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003), as applied to claim 41 above. To paraphrase claim 49, the filtration apparatus used in the recited method of claim 41 has further limitations. The filtration apparatus has a main body. At one end of the body is an inlet for water and an inlet for air. At the other end of the body is a discharge that can discharge clarified water or discharge waste. The main body is cylindrical. The flexible fibers extend along the main body. In Figures 20 and 21, Ytzhak Barzuza et al. discloses the invention except for the inlet for air. Zha et al. teaches the inlet for gas in Figure 1 that provides gas bubbles to "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers). Zha et al., Abstract, lines 8-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided the

Ytzhak Barzuza et al. filtration apparatus with the inlet for gas, as taught by Zha et al., in Figure 1, since Zha et al. states, in the Abstract, lines 8-10, that such a modification would "dislodge fouling materials" from the membranes 6 (applicant's flexible fibers).

Response to Arguments

25. Applicant's arguments with respect to claims 25-49 have been considered but are moot in view of the new ground(s) of rejection. Applicant cancelled all previous claims and presented new claims 25-49. Applicant then argued that the prior art used to reject claims 13-24 would not read on claims 25-49 and, therefore, claims 25-49 were allowable.

26. For the apparatus claims, applicant emphasized that the flexible fibers were solid, not porous. At one end of the main body, there is a discharge that can discharge clarified water or discharge waste. At the other end of the main body is an inlet for supply water and an inlet for air. For the methods claims, applicant emphasized that air is used during backwashing. Also, the method includes (1) before filtration, closing the waste discharge line and opening the clarified water discharge line, and (2) before backwashing, the opposite.

27. The examiner's response is that the new claims 25-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ytzhak Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986), in view of Zha et al. (US Patent No. 6,524,481 B2, Feb. 25, 2003). Applicant's arguments that the prior art does not read on the new claims is

addressed with the additional reference of Ytzhak Barzuza et al. and is discussed in more detail in the patentability analysis above.

Conclusion

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise R. Anderson whose telephone number is 571-270-3166. The examiner can normally be reached on Monday through Thursday, from 8:00 am to 6:00 pm.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DRA



DAVID SAMPLE
SUPERVISORY PATENT EXAMINER